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Imrana Masroor

Aga Khan University, imrana.masroor@aku.edu

Shaista Afzal

Aga Khan University

Gulnaz Shafqat

Aga Khan University

Yasir Jamil Khattak

Aga Khan University

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Comparison of stereotactic core breast biopsy and open surgical biopsy results at a tertiary care hospital in Pakistan

Imrana Masroor
Shaista Afzal
Gulnaz Shafqat
Yasir Jamil Khattak

Department of Radiology, Aga Khan
University Hospital, Karachi, Pakistan

Background: The purpose of this study was to determine the yield of stereotactic core breast biopsy and its cost-saving potential.

Methods: This observational study was conducted at the Department of Radiology at Aga Khan Hospital in Karachi. All female patients (n = 84) undergoing stereotactic core breast biopsy under mammographic guidance from January 2005 to May 2010 were included. Stereotactic core biopsy was performed on a dedicated mammography unit employing a 14-gauge needle with an automated biopsy device. Ten patients with incomplete medical records were excluded. All breast biopsy results were either compared with surgical findings in cases of malignant histopathological findings or with follow-up needle localization in case of benign core biopsy findings.

Results: Fifteen of our 74 patients had malignant findings on stereotactic biopsy, confirmed on histopathology of the final surgical mastectomy specimen. The remaining 59 patients had benign results on histopathology; five patients had needle localization of the same area due to either suspicious mammographic findings or clinical suspicion of malignancy. All were proven to be histopathologically benign on open surgical biopsy. Fifty-four patients with benign results had follow-up mammograms, and the follow-up period was 18 months to 5 years. The sensitivity and specificity was 100%. The cost saving per patient was US\$253.

Conclusion: Stereotactic core breast biopsy is a safe and cost-effective method for determining the nature of suspicious mammographic findings.

Keywords: stereotactic, breast biopsy, BI-RADS®, mammography

Introduction

Breast cancer is the most common cause of morbidity and mortality among women worldwide.¹ More than half of patients with breast cancer reside in developing countries, where resources to fight the disease are limited.² Most women suspected of having breast cancer are referred for breast biopsy to determine if the lesion seen on imaging is benign or malignant and whether further work-up and management is warranted. Most women undergoing breast biopsy have benign lesions and do not require further treatment. Recently published data for screening studies showed that 2616 open biopsies were performed in the UK in 2008–2009 and that 69% of these were benign and 31% were malignant. The malignant biopsy rate has shown a decline from 2.04 per 1000 women in 1996–1997 to 0.40 per 1000 women in 2008–2009, and that the nonoperative diagnosis rate for cancers has increased from 63% to 95%.³

Breast biopsies may be performed by open surgery (incisional or excisional biopsy) or by minimally invasive core needle biopsy. Core needle biopsy involves removing

Correspondence: Imrana Masroor
Department of Radiology, Aga Khan
University Hospital, Stadium Road,
PO Box 3500, Karachi 74800, Pakistan
Tel +922 1486 2052
Fax +922 1349 34294
Email imrana.masroor@aku.edu

small cores of breast tissue obtained by a shallow core needle inserted through the skin. Core needle biopsy is less expensive, has fewer complications and a shorter recovery time, and incurs less psychological trauma. According to a systematic review, stereotactic-guided and ultrasonography-guided core needle biopsy procedures seem to be almost as accurate as open surgical biopsies, and have a lower complication rate.⁴

Stereotactic breast biopsy using a 14-gauge needle is a reliable method of biopsy for nonpalpable breast lesions.⁵ The data suggest that 2%–4% of women undergoing screening mammography are referred for biopsy of a mammographic abnormality.⁶ The majority of these patients have benign lesions. The effort and cost involved in further evaluation of these abnormalities is huge, and most of this is incurred by surgical biopsies. Stereotactic breast biopsy is a less expensive and less invasive method of breast biopsy for evaluating mammographically detected suspicious breast lesions.

We conducted this study to determine the yield of stereotactic core needle biopsy for evaluation of mammographically detected nonpalpable lesions, and its effect on cost saving for the patient.

Methods

This descriptive study was conducted in the Department of Radiology at the Aga Khan University Hospital in Karachi from January 2005 to May 2010. All patients ($n = 84$) undergoing stereotactic breast biopsy in the department were included. All prebiopsy mammograms were reviewed independently by two consultant radiologists. The mammographic findings were categorized according to the Breast Imaging Reporting And Data System (BI-RADS®) assessment criteria. The biopsy was performed on a Mammomat Nova 3000 (Siemens AG, Berlin, Germany) using an Opdima stereotactic biopsy device. A 14-gauge needle with an automated gun was used. On average, 5–6 cores were taken. The specimens removed were radiographed to confirm that the sample contained the targeted suspicious microcalcifications or parenchymal density. Ten patients with incomplete medical records were excluded. The age of the patient, indication for mammography, histopathological outcome, and further management were recorded from patients' personal files. Concordance between the mammographic abnormality and histopathological results was determined using Kappa statistics. A P value <0.05 was considered statistically significant.

The yield was determined by calculating the sensitivity and specificity of stereotactic core biopsy. The cost comparison was done by calculating the difference between the charges for stereotactic biopsy and open surgical biopsy per patient.

Results

Eighty-four women underwent stereotactic core biopsy during the study period. Their mean age was 57 ± 1.3 years. Of these, ten had incomplete medical records or follow-up and were excluded. Of the remaining 74 women, prebiopsy mammograms were categorized as BI-RADS II in 25 cases, BI-RADS III in 16 cases, BI-RADS IV in 27 cases, and BI-RADS V in six cases. The biopsy was performed in patients with BI-RADS category II mammograms either because of strong family history or a history of malignancy in the contralateral breast in order to decide on an appropriate management plan. Similarly, in mammograms reported as BI-RADS III, a biopsy was performed because the clinician did not want to wait for 6 months to obtain a follow-up mammogram, to alleviate patient anxiety, or if the clinician was concerned that the patient would not attend the follow-up mammography. Biopsy was performed in 23 patients to evaluate a suspicious parenchymal density or nodule and in the rest for suspicious microcalcifications seen on mammography. In a few patients, a mass was clinically palpable, but the clinician opted for image-guided biopsy as a means to target microcalcifications in the mass. Among the patients who underwent biopsy, 15 had malignant findings confirmed on histopathology of the final surgical mastectomy specimen. The remaining 59 patients had benign results on histopathology; five of these patients had needle localization in the same area due to either suspicious mammographic findings or strong clinical suspicion of malignancy. All were proven histopathologically to be benign on open surgical biopsy. Fifty-four patients with benign results on histopathology were also followed up with mammograms. The follow-up period was 18 months to 5 years, and confirmed benign findings. The sensitivity and specificity was 100%. Excellent agreement was noted between mammographic abnormality and histopathological results with a Kappa value of 8 ($P = 0.000$). The cost of stereotactic core biopsy at our institution is US\$100, whereas open surgical biopsy after needle localization costs US\$353. This represents an obvious cost saving of US\$253 per patient.

Discussion

Pakistan has a higher burden of breast cancer than other Asian countries.^{7,8} Image-guided breast biopsy techniques

were developed to overcome the diagnostic problem of increasing numbers of suspicious lesions detected at mammography.⁷ Stereotactic breast biopsy using a 14-gauge needle is an accurate method of tissue sampling for nonpalpable breast lesions, and was used for the first time in Sweden in 1974 for fine needle aspiration cytology.⁵ Improvement in techniques over the last 30 years have allowed this method to be used to assess both palpable and nonpalpable lesions of the breast in both screening and symptomatic settings.⁹

According to most published reports, the targets for core biopsy are all types of nonpalpable mammographic abnormalities, including a mass, calcifications, or a calcified mass.^{10–12} The reported concordance for surgical and stereotactic biopsy is 87%–96%.¹⁰

Our results show that 80% of all lesions biopsied were benign, which is comparable with a study conducted by Jackman et al.¹³ Recently published screening data from the UK show that 2616 open surgical biopsies were performed in 2008–2009, of which 69% were benign and 31% were malignant.³

Biopsy results strongly influence the algorithm for evaluation of suspicious lesions. The biopsy method must be minimally invasive, accurate, and cost-effective. The cost of stereotactic core biopsy at our institution is US\$100 whereas the cost of open surgical biopsy after needle localization is US\$353. This represents an obvious cost saving of US\$253 per patient.

Open surgical biopsy requires a 1-day hospital admission, and is associated with more anxiety on the part of the patient about undergoing a procedure in an operating room. It is also associated with more breast scarring. In contrast, stereotactic breast biopsy does not require hospital admission and the entire procedure is completed in 1 hour, it is associated with no scarring clinically or radiologically, and patients can resume their daily activities immediately after the procedure.

Our study showed a sensitivity of 100%, which is comparable with that in a study conducted by Peters et al.¹⁴ In this study, all patients with benign findings on stereotactic biopsy underwent surveillance mammography which is routine clinical practice. No breast malignancy was missed on surveillance mammography after 2 years of follow-up mammography. However, the COBRA (COre Biopsy after RAdiological localization)¹⁵ study reported a sensitivity of 97%. In COBRA, all lesions, whether benign or malignant on stereotactic core needle biopsy, underwent open surgical biopsy.

Our specificity was 100% which is similar to the 99% specificity reported by the COBRA study, in which 973 patients underwent stereotactic core needle biopsy followed by open surgical biopsy if the results of stereotactic core needle biopsy were benign, and therapeutic surgery if the results of stereotactic core needle biopsy were malignant. In our study, only five patients underwent open surgical biopsy if the results were benign, and the rest of the patients were followed up by surveillance mammography over a follow-up period of 18 months to 5 years.

There were a few limitations to our study. A small sample size might have resulted in 100% sensitivity and specificity; all patients with benign results on stereotactically guided core needle biopsy did not undergo open surgical biopsy, and were followed up by surveillance mammography, although the follow-up period ranged from 18 months to 5 years.

Conclusion

Stereotactic core breast biopsy is a safe and cost-effective method for determining the nature of suspicious finding on mammograms. In patients with benign findings on stereotactically guided core needle biopsy, surgical excision is not warranted, but studies with larger numbers of patients are needed to generalize this recommendation.

Disclosure

The authors report no conflicts of interest in this work.

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